

COSSARO Candidate Species at Risk Evaluation
for
Little Brown Myotis (*Myotis lucifugus*)
[formerly Little Brown Bat]

Committee on the Status of Species at Risk in Ontario (COSSARO)

Assessed by COSSARO as ENDANGERED

May 2012

Final

Jusqu'à tout récemment, la **Petite chauve-souris brune** (*Myotis lucifugus*) était une espèce commune dans tout le Canada et les États-Unis. Se nourrissant principalement la nuit d'insectes attrapés au vol, les membres de cette espèce passent la nuit dans des arbres et des structures humaines durant l'été et hibernent dans des cavernes fraîches et humides et des mines abandonnées. Le syndrome du museau blanc (SMB), une maladie causée par un champignon (*Geomyces destructan*), a donné lieu à une baisse notable des populations hibernantes dans le nord-est de l'Amérique du Nord depuis la première observation il y a six ans (février 2006) dans une caverne près d'Albany, New York. La maladie s'est répandue au rythme d'environ 200-400 km par année, atteignant l'Ontario et le Québec en 2010, et le Nouveau-Brunswick et la Nouvelle-Écosse en 2011. Le SMB ne semble pas encore présent à l'ouest de Wawa, Ontario, mais les baisses de population dans les huit cavernes ayant fait l'objet de relevés avant et après l'apparition du SMB atteignent en moyenne plus de 90 p. 100. Le manque de surveillance et de connaissances de base sur les populations pré-SMB empêche de faire des estimations précises des effets sur l'ensemble de la population, mais les preuves de mortalité attribuable au SMB au Nouveau-Brunswick, en Nouvelle-Angleterre et dans l'État de New York suscitent de graves préoccupations quand à la persistance de cette espèce en Ontario. La Petite chauve-souris brune est classée comme espèce **en voie de disparition** en Ontario.

Cette publication hautement spécialisée, COSSARO Evaluation for Little Brown Myotis n'est disponible qu'en anglais en vertu du Règlement 671/92 qui en exempte l'application de la Loi sur les services en français. Pour obtenir de l'aide en français, veuillez contacter le secrétariat de COSSARO par courrier électronique à l'adresse COSSAROsecretariat@ontario.ca.

PART 1 Current status and distribution

Current designations:

GRANK – G5 (Last Reviewed 14/01/2008) (NatureServe, accessed 09/05/2012)

NRANK Canada – N5 (Assessed 31/12/2011) (NatureServe, accessed 09/05/2012)

COSEWIC – Endangered (COSEWIC, February 2012)

SARA – Not Listed

ESA 2007 – Not Listed

SRANK – S4 (NHIC, accessed 09/05/2012)

Distribution in Ontario:

The Little Brown Myotis (*Myotis lucifugus*) (formerly Little Brown Bat) has been one of the most common and widely distributed bats in Canada. This species is widespread in southern Ontario and scattered distribution records suggest that the same is true in northern Ontario, where it occurs as far north as Moose Factory and Favourable Lake (Natural Heritage Information Centre 2012).

Distribution and status outside Ontario:

Outside Ontario, the Little Brown Myotis occurs in 46 US states and 12 Canadian provinces/territories (NatureServe 2012). In the US it occurs in all continental states except Arizona, Texas, and Louisiana. In Canada, it occurs across southern Canada from Newfoundland to British Columbia and northwestward to the Yukon and Northwest Territories (NatureServe 2012). Little Brown Myotis have been recently listed as Endangered in Vermont and Massachusetts, and Special Concern in Maine, Indiana, and Ohio. In an emergency assessment that took place in January 2012, this bat species was assessed as Endangered by COSEWIC.

PART 2 Eligibility for Ontario status assessment

2.1 Application of eligibility criteria

Taxonomic Distinctness

Yes. Little Brown Bat is a distinct species (Miller and Allen 1928).

Designatable Units

One Designatable Unit. There is no known significant genetic or other differentiation within the species range in Ontario to warrant separate designatable unit status.

Native Status

Yes.

Presence/Absence

Present.

2.2 Eligibility results

1. The putative taxon or DU is valid. **Yes.**
2. The taxon or DU is native to Ontario. **Yes.**
3. The taxon or DU is present in Ontario, extirpated from Ontario or extinct? **Present.**

PART 3 Ontario status based on COSSARO evaluation criteria

3.1 Application of primary criteria (rarity and declines)

1. Global Rank

Not in any category. G5. (NatureServe 2012). The G-rank of this species was last reviewed in 2008, prior the recording of many mortality events and less than two years after the discovery of White Nose Syndrome.

2. Global Decline

Threatened.

White nose syndrome (WNS) has been the major cause of documented mortality in Little Brown Myotis since the disease arrived in North America in 2006. Population size and trends for this species across its global range are not known, but were assumed to be abundant and stable before the arrival of WNS (COSEWIC 2012). Any declines that have taken place can only be inferred from pre- and post-WNS monitoring of known hibernacula. Even then, a lack of baseline population information precludes an evaluation of what proportion of the population is represented by such inferred declines, since not all hibernacula are known, let alone receive regular monitoring attention. The majority of underground hibernacula, mainly caves and mines in North America, have never been surveyed for bats.

As of January 2012, WNS has been recorded in over 200 hibernacula in 19 states and 4 provinces (Coleman 2012), and is spreading at a rate of approximately 200-400km per year (COSEWIC 2012). First recorded in New York, WNS has been centered in northeastern North America and is spreading south and west. While WNS has been recorded in less than 30% of the global range of this species, the spread has been swift, and a lack of baseline population information (particularly outside of northeastern North America) precludes any knowledge of what proportion of the global population has already been affected. It is, however, assumed that the rate of spread and the mortality levels recorded to date will continue westward and impact most of the global population within the next 20 years (Frick *et al.* 2010). For example, Hallam and Federico (2011) predicted that much of the United States has the conditions for WNS, assuming spread between colonies will occur as it has in eastern North America, based on growing conditions of the fungus that causes WNS, including minimum and maximum temperatures in hibernacula, and the relationship of temperature and lipid reserves in Little Brown Bat. This could be characterized as a serious regional decline which would therefore qualify this species as Threatened under this criterion.

3. Northeastern North America Ranks

Not in any category. Little Brown Myotis is a native species in 29 of 29 northeastern

jurisdictions and ranking information is available for 27 (93%) of these jurisdictions (see Appendix 1). The species is currently ranked as S1 or S2 in only 1 of 27 jurisdictions (3.7%) according to the NatureServe website (NatureServe 2012). However, the NatureServe ranks ascribed to most jurisdictions were evaluated pre-WNS. Although several states and provinces have changed the ranks recently, these are not yet implemented in the website database (see Appendix 1). For example, Quebec, PEI, Nova Scotia, Vermont, and West Virginia all recently changed their ranks, bringing the proportion of high ranked jurisdictions up to 22%. Even in consideration of these recent changes, this species does not qualify for any status category under this criterion. Other states (e.g., Ohio, Massachusetts, New York, New Brunswick) are preparing to re-evaluate jurisdictional S-ranks.

4. Northeastern North America Decline

Endangered. As noted in Global Decline above, the epicentre of the WNS epizootic is located in northeastern North America (near Albany, New York), and 20 of 29 northeastern jurisdictions have confirmed the presence WNS, with all others anticipating this inevitability (Appendix 1). The general pattern has been an average decline of 73% for Little Brown Myotis, recorded in 115 infected hibernacula in the northeastern U.S. (Frick *et al.* 2010) within 2 years of infection and 91% for the 54 hibernacula with more than 2 years' exposure to WNS. Most mass mortality events have taken place in portions of New York, Vermont, Massachusetts, and Connecticut. Large hibernacula in most jurisdictions appear to be affected first, within 2 years of first WNS detection (Appendix 1).

In Quebec, 5 hibernacula are being monitored and 1 hibernaculum (Mine-aux-Pipistrelles, southern Quebec) recorded a decrease from >5000 to 8 bats in autumn 2011, concurrent with hundreds of dead bats on the ground, 90% of which were Little Brown Bats (Mainguy and Desrosiers 2011). In New Brunswick, a 94% decline in all bats was recorded at one site over 2 years (McAlpine *et al.* 2011), 91% of which were little brown bats (D. McAlpine, pers. comm.). The largest known bat colony in the province experienced a nearly 100% mortality by the second year following WNS detection. WNS was recorded in an additional 3 sites in December 2011. Declines in summer breeding populations in Northeastern North America have also been recorded. Data from summer are sporadic and acoustic monitoring has only recently begun in many jurisdictions. Monitoring results from surveys of summer maternity colonies of Little Brown Myotis in Massachusetts indicate declines of >70% in the last 3 years (Gillman *et al.* 2011; unpub. data). Large mortality or decline events had not been recorded in Quebec until this autumn; declines are expected to be evident next summer in several areas. Summer data on population size or trends are not available for the Maritimes.

In Canada, the rate of spread from the epicenter to the first site in New Brunswick was 200km/yr, and from the epicenter to the farthest western site to date (Wawa, Ontario) was 250km/yr. The average rate of spread appears to range between 200-400km/yr (COSEWIC 2012). Given this rapid spread of WNS in the Northeastern North American jurisdiction (200-400km/yr) and the drastic levels of population decline (91%-99%) in 5 study sites affected by WNS over 2 years, this species qualifies as Endangered under this criterion of $\geq 50\%$ noncyclical decline in abundance in this region over the past 5 years -- well within 3 generations for this species (generation time 3-10 years; COSEWIC 2012).

5. Ontario Occurrences

Not in any category. There are well over 100 extant known sites (element occurrences) in Ontario (Natural Heritage Information Centre 2012).

6. Ontario Decline

Threatened.

Mortality estimates for bats post-WNS in Ontario are severely limited because of government's general policy of denying staff/people from entering mines in winter, a practice that can preclude monitoring. Acoustic surveys have begun, but it is unclear if some areas have already been impacted by WNS before the survey. Population size and trends for the Little Brown Myotis before the arrival of WNS are not known in the province, and Little Brown Myotis are not even tracked by NHIC. This species has always been assumed to be abundant and stable in the province, which is also the reason it has received so little monitoring attention (COSEWIC 2012). In Ontario, average declines in bat populations for 8 known hibernacula sites with > 2 years exposure to WNS was 92% (COSEWIC 2012). Data from 2012 winter are not yet available as of this writing (Table 1; Lesley Hale, OMNR, pers. comm.).

None of these sites is monitored frequently enough in the winter to observe major mortality episodes; however, a notable decline in population is evident at all monitored sites. Apart from the general lack of monitoring attention on bats, other factors including government policies forbidding access to caves in winter and abandoned mines and the possibility of scavengers consuming carcasses before they are counted (e.g., McAlpine *et al.* 2011), create further challenges for documenting WNS mortality events. In one site near Dunnville, Golder Associates undertook an acoustic monitoring program from May-October in 2009, 2010, and 2011, finding a significant increase in Little Brown Myotis activity levels from 2009 to 2010 followed by a significant decrease from 2010 to 2011, while activity levels between 2009 and 2011 are not significantly different. Whether or not 2010 was represented a year of unusually high activity or 2011 represented a decline could not be confirmed, particularly with no corresponding tracking of climate data (Morningstar and Zimmerling 2012).

In 2010, white nose syndrome was confirmed in bats in Bancroft-Minden, Kirkland Lake, Flesherton, Faraday, Belleville and Renfrew County, and in 2011, it was confirmed from the Timmins, Wawa, Mattawa, Simcoe, Peel and Halton areas (OMNR 2012). All sites are known to be infected with WNS either through lab testing or visual observation. No population data are available from these locations which might allow calculation of declines. WNS has not been documented in hibernacula west of Wawa (Martinez *et al.*, 2012).

While WNS has yet to be detected in some hibernacula in the northwestern part of the province, other parts of Little Brown Bat range in Ontario have been affected in a short period of time. Of the 8 caves in the WNS zone with survey data, all were affected. Those few sites where pre- and post-WNS data exist, have average decline rates of 92% for all bats, but there is no way of knowing what proportion of the population these represent. Assuming all significant hibernacula are affected within WNS range in Ontario and given known mortality rates, a decline of at least 30% could be assumed.

7. Ontario's Conservation Responsibility

Not in any category.

The range map (NatureServe 2012) suggests that Ontario accounts for 8.2% of the species range, below the threshold for Threatened under this criterion. The population of Little Brown Myotis in Ontario, as a percentage of the total population, is unknown.

3.2 Application of secondary criteria (threats and vulnerability)

8. Population Sustainability

Endangered.

The decline rates in Ontario mentioned above and in Table 1 provide definite evidence of recruitment failure. Moreover, model predictions (Frick *et al.* 2010) for species in the northeastern US based on 30 years of pre-WNS data and 4 years of documented declines since WNS, predict a 99% probability of 'regional extinction' within 16 years. If WNS spreads at the current rate (range: 200-400km/yr), it could occur across Canada within 11-22 years, approaching the estimated range of 5 generations (15-50 years) (COSEWIC 2012). Available data suggest all age classes in affected populations are succumbing to WNS.

9. Lack of Regulatory Protection for Exploited Wild Populations

Not in any category.

Little Brown Myotis are listed as specially protected mammals under Schedule 6 of the Fish and Wildlife Conservation Act (FWCA). The FWCA prohibits bats from being hunted or trapped in Ontario.

10. Direct Threats

Endangered.

Canadian bats that hibernate underground, including Little Brown Myotis, are dying from White-nose Syndrome, caused by a fungus, *Geomyces destructans*, that was (inadvertently) imported from Europe to North America. The fungus grows in humid cold environments, typical of underground hibernacula used by bats (Blehert *et al.* 2009). An estimated 1 million bats have died in northeastern US within 3 years of exposure (Kunz and Tuttle 2009), with a recent mortality estimate of 5.7-6.7 million bats made by the WNS management team in the United States (U.S. Fish and Wildlife Service news release; January 17, 2012). WNS kills by disrupting the hibernation cycle of bats, ensuring that they exhaust supplies of stored food (body fat) in January or February, rather than in March or April (Warnecke *et al.* 2012). Physiological processes associated with hydration, and damage to wings may also be related to mortality (Cryan *et al.* 2010). WNS was first recorded 6 years ago (February 2006) in a cave near Albany, New York (Frick *et al.* 2010), spreading at a rate of approx. 200-400km per year and reaching Ontario and Quebec in 2010, and New Brunswick and Nova Scotia in 2011. This species qualifies for Endangered under this criterion because more than 75% of Ontario sites are at high risk of disappearance due to WNS alone, which has been documented to have a devastating effect on Little Brown Myotis populations in Ontario and elsewhere. Mass die-offs simply mean that there are no individuals left to reproduce.

An additional agent of mortality in Ontario that has appeared relatively recently is windfarms. With the recent increase of windpower generating facilities, bat fatalities are being routinely documented where surveyed. While migratory tree bats appear to be most susceptible, Little Brown Myotis are also susceptible. In a summary of 152 months of post-construction monitoring activity in 9 Ontario sites (with 474 turbines) during April-October, Environment Canada *et al.* (2011) reported Little Brown Myotis as being the second most common bat casualty following Hoary Bat, representing 27% of 1133 bat carcasses. However, the significance of these mortality statistics from a population perspective are impossible to discern, and so the most that can be said is that windfarms represent an additional source of mortality for Little Brown Myotis that raise some concerns about cumulative impacts of wind energy development on bat populations. Although there are both federal (Canadian Environmental Assessment Registry) and government-industry cooperative (Wind Energy Bird and Bat Monitoring Database) central repositories for windfarm mortality data, the lack of both baseline population data and coordination and/or collation of results means that there is little understanding of the significance of this source of mortality for Little Brown Myotis in Ontario.

11. Specialized Life History or Habitat-use Characteristics Endangered.

Temperate bats, including such as those that occur in Canada (and Ontario), are insectivorous and many species hibernate underground. WNS from Europe has a deadly effect on North American bats, but not European congeners. The use of underground hibernation sites exposes the bats to the fungus, and bat-bat contact during swarming ensures its spread. This vulnerability, coupled with life history features (long life span, low reproductive rate), puts little brown bats on a trajectory to potential extirpation (Fenton 2012). Populations of bat species that occur in Canada do not have the reproductive capacity to recover quickly from the high rates of mortality caused by WNS. Previously unencountered mortalities from the expansion of windfarms present another, possibly additive, mortality source. This puts Ontario Little Brown Myotis at a very high level of risk due to the environmental changes that are currently taking place, thereby qualifying the species for Endangered status under this criterion.

3.3 COSSARO evaluation results

1. Criteria satisfied in each status category

Endangered – [1/3]

Threatened – [1/0]

Special Concern – [0/0]

Ontario-specific criteria (primary criteria numbers 5, 6 and 7):

Endangered – [0]

Threatened – [1]

Special Concern – [0]

2. Data Deficiency

No. No criteria assessed were as “insufficient information”.

3. Status based on COSSARO evaluation criteria

The application of COSSARO evaluation criteria suggests that Little Brown Myotis is **Endangered** in Ontario.

PART 4 Ontario status based on COSEWIC evaluation criteria

4.1 Application of COSEWIC criteria

Regional (Ontario) COSEWIC Criteria Assessment

Criterion A – Decline in Total Number of Mature Individuals

Endangered.

A3b, c,e: COSEWIC Criterion of 'projected reduction in total number of mature individuals is >50% over 3 generations' is met, based on documented declines. With three generations at 9-30 years; spread of WNS expected to be across entire Canadian range in <22 years. Subcriterion b relates to declines at hibernacula being an index of abundance; subcriterion c relates to reduction in quality of habitat, in this case hibernacula, a critical limiting habitat feature are (or soon will be) infected with *Geomyces destructans*; and subcriterion e applies because *Geomyces destructans*, the cause of WNS, is believed to be an introduced pathogen from Europe.

A4c,e also applies because impact of WNS at present, combined with future predictions exceeds 50%, and reduction or cause may not cease and may not be reversible, given lack of remedy.

Criterion B – Small Distribution Range and Decline or Fluctuation

Not Applicable. EO and IAO exceed thresholds.

Criterion C – Small and Declining Number of Mature Individuals

Not Applicable. Although there is evidence of decline in mature individuals, the population likely still exceed thresholds.

Criterion D – Very Small or Restricted Total Population

Not applicable. Population size still exceeds thresholds

Criterion E – Quantitative Analysis

Endangered. COSEWIC Criterion of minimum 20% probability of extinction within 20 years or 5 generations is met because results from nearby and similar region have modeled regional extinction of Little Brown Myotis within 20 years at 99% probability. Little Brown Myotis are predicted to be impacted across Canadian range before the 5 generation (15-50 years) threshold.

Rescue Effect

No. There is a very low likelihood of a rescue effect. The Little Brown Myotis in Canada is at the northern edge of its geographic range and therefore any rescue would need to come from southern populations in the United States. The high mortality rates associated with WNS have occurred in the regions south of Canada and populations

are so reduced that immigration north into Canada is very unlikely. There is no expectation that western populations of Little Brown Myotis will be immune to WNS, further precluding the possibility of rescue effect.

Special Concern Status

Not applicable.

4.2 COSEWIC EVALUATION RESULTS

1. Criteria satisfied in each status category

Indicate whether or not a criterion is satisfied in each of the status categories.

Endangered – [Yes]

Threatened – [N/A]

Special Concern – [N/A]

2. Data Deficiency

No.

3. Status based on COSEWIC evaluation criteria

The application of COSEWIC evaluation criteria suggests that **Little Brown Myotis** is **Endangered** in Ontario.

PART 5 Ontario status determination

5.1 Application of COSSARO and COSEWIC criteria

Determine the appropriate method of applying the results obtained in parts 3 and 4: COSSARO and COSEWIC criteria give the same result. **Yes.**

5.2 Summary of status evaluation

Little Brown Myotis is classified as **Endangered** in Ontario.

Until recently, the Little Brown Myotis (*Myotis lucifugus*) (formerly Little Brown Bat) has been common throughout much of Canada and the United States. Feeding primarily at night on insects caught in the air, members of this species roost in trees and human structures during the summer and hibernate during winter months in cool, damp caves and abandoned mines. White Nose Syndrome (WNS), a disease caused by a cold-loving fungus *Geomyces destructans*, has caused dramatic declines at hibernacula of this species in northeastern North America since it was first recorded 6 years ago (February 2006) in a cave near Albany, New York. It has spread at a rate of approx. 200-400km per year, reaching Ontario and Quebec in 2010, and New Brunswick and Nova Scotia in 2011. WNS is not yet known to be present west of Wawa, Ontario, but declines in all 8 caves that have been monitored in infected areas of Ontario before and after WNS have averaged >90%. Lack of monitoring attention and baseline knowledge about population numbers pre-WNS precludes any precise estimate of impact to the population at large, but evidence of WNS mortality events in New Brunswick, New England and New York is a cause of profound concern for the continued persistence of this species in Ontario.

Information Sources

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2. Community and Aboriginal Traditional Knowledge Sources

Morningstar and Zimmerling 2012 (see above for citation).

3. Acknowledgements

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Appendix 1 Northeastern North America status rank and decline

Note: Most decline statistics are for all bats unless otherwise noted (LB=Little Brown). In all cases, however, "bats" comprise mostly Little Brown species.

	Subnational Rank (Natureserve 2012)	WNS present? And declines/mortality if known.	Source(s)
CT	S5	WNS first detected in 2008; 80-90% mortality in the state's major hibernacula in 2009-10	http://whitenosesyndrome.org/sites/default/files/files/ctdep_march_2008.pdf http://whitenosesyndrome.org/sites/default/files/files/ctdep_wns_april_2010.pdf
DE	S5	WNS first recorded in 2010	http://www.dnrec.delaware.gov/
IL	S5	WNS not known to be present	http://www.whitenosesyndrome.org/sites/default/files/files/idnr.pdf
IN	S4	WNS first recorded in 2011	http://www.in.gov/portal/news_events/66544.htm
IA	S4	WNS not known to be present	http://www.iowadnr.gov/Education/lowasWildlife/WhiteNoseBatSyndrome.aspx
LB	S4	WNS not known to be present	
KY	S5	WNS first recorded in 2010	https://www.whitenosesyndrome.org/
MA	S5	WNS first recorded in 2007; 72% reduction in bat activity on the watershed compared to pre-WNS; rate of decline reported from cave hibernacula surveys 73%.	http://www.whitenosesyndrome.org/ Brooks 2011
MB	S5	WNS not known to be present	
MD	S4	WNS first recorded in 2010	http://www.dnr.state.md.us/
ME	S5	WNS first recorded in 2011	http://www.maine.gov/tools/whatsnew/index.php?topic=IFW_News&id=247640&v=article
MI	S5	WNS not known to be present	http://www.michigan.gov/dnr/0%2C1607,7-153-10370_12150-246555--,00.html
MN	SNR	WNS not known to be present	http://www.dnr.state.mn.us/
NB	S4	WNS first recorded in 2011; ⁸ / ₁₀ known hibernacula surveyed since 2008 for total of 89% decline since WNS	D. McAlpine and K. Vanderwolf, NB Museum, unpubl. data.
NF	S4	WNS not known to be present	

	Subnational Rank (Natureserve 2012)	WNS present? And declines/mortality if known.	Source(s)
NH	S5	WNS first recorded in 2007; some populations declining 99%	http://www.wildlife.state.nh.us/wildlife/
NJ	S5	WNS first recorded in 2007. Media reports in 2010 give estimates of 90% declines by scientists	http://www.nj.com/news/index.ssf/2010/04/fungus_kills_90_percent_of_nj.html
NS	S1 [*] (J. Klymko, Atlantic Canada Conservation Data Centre)	WNS first recorded in 2011.	H. Broders, St. Mary's University, unpubl. data
NY	S5	WNS first recorded in 2006; Of 24 bat colonies surveyed, 20 were in decline. For these 20 colonies, the average decline was -91.20% for LB (SD 12.83); Range (-100%, -57%)	Turner et al. 2011
OH	SNR	WNS first recorded in 2011.	http://ohiodnr.com/
ON	S4	WNS first recorded in 2010. In eastern Ontario, 8 hibernacula had average declines of 92% in bats, a majority of which were LB, after 2 years of exposure to WNS	https://www.ontario.ca/page/wildlife-and-nature OMNR, unpubl. data
PA	S1	WNS first recorded in 2006. Of the 6 bat colonies surveyed, all were in decline. The average decline was -94.5% for LB (SD 12.03), Range = (-100%, -70%)	Turner et al. 2011
PE	S1 [*] (J. Klymko, Atlantic Canada Conservation Data Centre)	WNS not known to be present, although declines are suspected in maternal roosts	J. Klymko, Atlantic Canada Conservation Data Centre, in litt.
QC	S1 [*] (M. Desrosiers, Ministère des Ressources naturelles et de la Faune)	WNS first recorded in 2010. Decline of 98-99% in 5 hibernacula.	Mainguy and Desrosiers 2011
RI	S5	WNS not known to be present	

	Subnational Rank (NatureServe 2012)	WNS present? And declines/mortality if known.	Source(s)
VA	S5	WNS first recorded in 2009; 2 bat colonies surveyed, with average decline -59.5% for LB (SD 38.89), Range = (-87%, -32%)	http://www.dgif.virginia.gov/wildlife/bats/white-nose-syndrome/ Turner et al. 2011
VT	S1* (S. Darling, Vermont Fish & Wildlife Dept)	WNS first recorded in 2008. Darling and Smith found a 76% decline in 8 hibernacula. Turner et al. found of 5 bat colonies surveyed, all were in decline. The average decline was -95.2% for LB (SD 5.54), Range = (-100%, -86%)	http://www.vtfishandwildlife.com/ Turner et al. 2011 Darling and Smith 2011
WI	S3	WNS not known to be present	http://dnr.wi.gov/wnrmag/2010/08/bats.pdf
WV	S3* (M. Welch, WV-Division of Natural Resources)	WNS first recorded in 2009; Of 3 monitored bat colonies, average decline was -94.67% for LB (SD 3.06), Range = (-98%, -92%)	http://www.wvdnr.gov/2009news/09news033.shtm Turner et al. 2011

* Ranks differ from NatureServe website, reflecting recent updated status assessments have not been implemented in the NatureServe database

Occurs as a native species in 29 of 29 northeastern jurisdictions

Strank or equivalent information available for 27 of 29 jurisdictions = (93%)

S1, S2, SH, or SX in 6 of 27 = (22%)

Table 1. Changes in abundance estimates for bats using hibernacula (caves or mines) in Ontario. The majority of bats are Little Brown Myotis, but sites also include Northern Myotis and Tri-coloured Bat. Average decline is 90% in sites with > 2 years of post-WNS exposure. Note: as of this writing, winter data from 2012 have not yet been analyzed (Lesley Hale, pers. comm.). Information courtesy of Ontario Ministry of Natural Resources.

Site name	Individuals counted and date count completed 2009	Individuals counted and date count completed 2010	Individuals counted and date count completed 2011	Percent change 2009 to 2010	Percent change 2010 to 2011	Total Percent change
Craigmont	30,461 November 2, 2009	24,837 November 1, 2010	1,457 October 24, 2011	-18%	-94%	-95%
Hunt (Renfrew)	14,378 October 20, 2009	7,005 November 7, 2010	2,638 November 5, 2011	-51%	-62%	-82%
Crystal Lake	725 Fall? 2009	539 November 29, 2010	10 November 4, 2011	-26%	-98%	-99%
Croft*	N/A	3000+ October 2, 2010	1,537 November 4, 2011	N/A	-49%+	-49%+
Silver Crater	N/A	251 November 29, 2010	29 November 4, 2011	N/A	-89%	-89%
MacDonald	N/A	21 November 23, 2010	0 November 4, 2011	N/A	-100%	-100%
Watson	N/A	96 November 23, 2010	0 November 4, 2011	N/A	-100%	-100%
Clyde Forks	N/A	117 November 30, 2010	7 November 2, 2011	N/A	-94%	-94%

Table 2. Change in population estimates in 5 maternity roost sites in eastern Ontario. The majority of bats are Little Brown Myotis, but sites also include Northern Long-eared and Tri-coloured Bat. Averaged trends is 71% decline. Data courtesy of Ontario Ministry of Natural Resources.

Site name	Late May 2010	Mid July 2010	Late May 2011	Mid July 2011	Percent Change
Springtown Church		500+		53	-89%
Foy Road Church		67		75	+12%
Burnstown Church		400		58	-86%
Cameron Farms	57		52		-9%
Petawawa Church		81		78	-4%